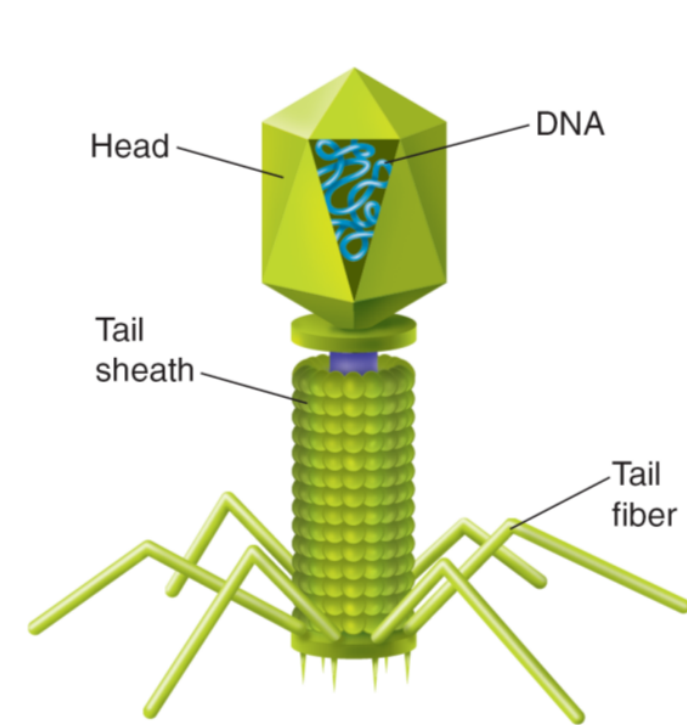


# Viruses

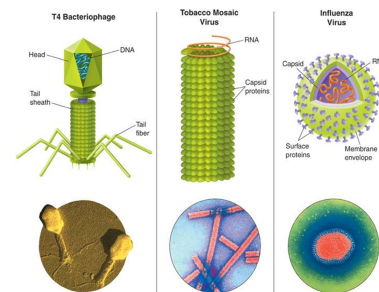


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## Non-Living???

Viruses DO NOT:

- Metabolize on their own
- Reproduce
- Move
- Take in food
- Grow
- Consist of cells



By this definition, viruses, are not classified in any Kingdom of living organisms.

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## Characteristics of a Virus

- 1) Viruses have no cellular structure - lack cytoplasm, organelles, cell membrane, ...
- 2) Viruses don't carry out respiration or many other life processes.
- 3) Consist of little more than strands of DNA or RNA surrounded by a protective protein coat called a **capsid** and **ligands**.
  - Capsid** - protects the virus from attack by the host organism's enzymes.
  - Ligand** - a receptor binding molecule on the surface of a virus that helps it attach to a host cell - attaches to the cell membrane.
- 4) Some are only able to replicate only in a particular species while others can replicate in multiple species.

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## Classifying Viruses

First identified in 1935, and currently there exists 160 major groups. Members of different groups differ in their size and shape.

The type and arrangement of proteins in the capsid determine the shape of a virus. Four basic shapes viruses often take are:

- 1) Polyhedral - resemble small crystals and may have as many as 20 sides (ex Polio virus)
- 2) Cylindrical - Ex. Tobacco mosaic virus
- 3) Spherical - Ex. HIV virus
- 4) Polyhedral head attached to a protein tail and several small fibers - Ex. T4 virus

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- Viruses are also classified based on the types of diseases they cause. Viruses that infect humans are classified into 21 groups. These groups differ in their genomes (set of genes) and their replication methods.
- One of the major ways viruses are classified is based on whether or not they are a DNA or RNA virus.

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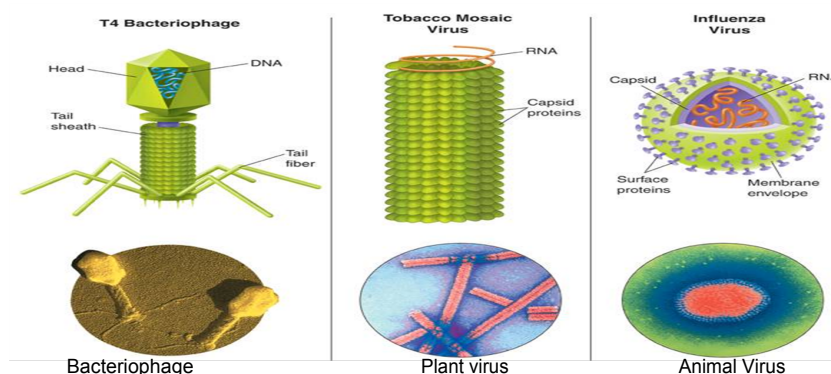
## How does a virus find it's host cell?

Cells have protein receptors throughout their plasma membrane.

Viruses have ligands that bind to the cells protein receptors that enable a virus to enter a host cell.

Viruses are highly specific to the cells they infect:

1. Plant viruses infect plant cells.
2. Animal viruses infect animal cells.
3. Bacterial viruses (Bacteriophages) infect bacterial cells.



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## Viral Replication

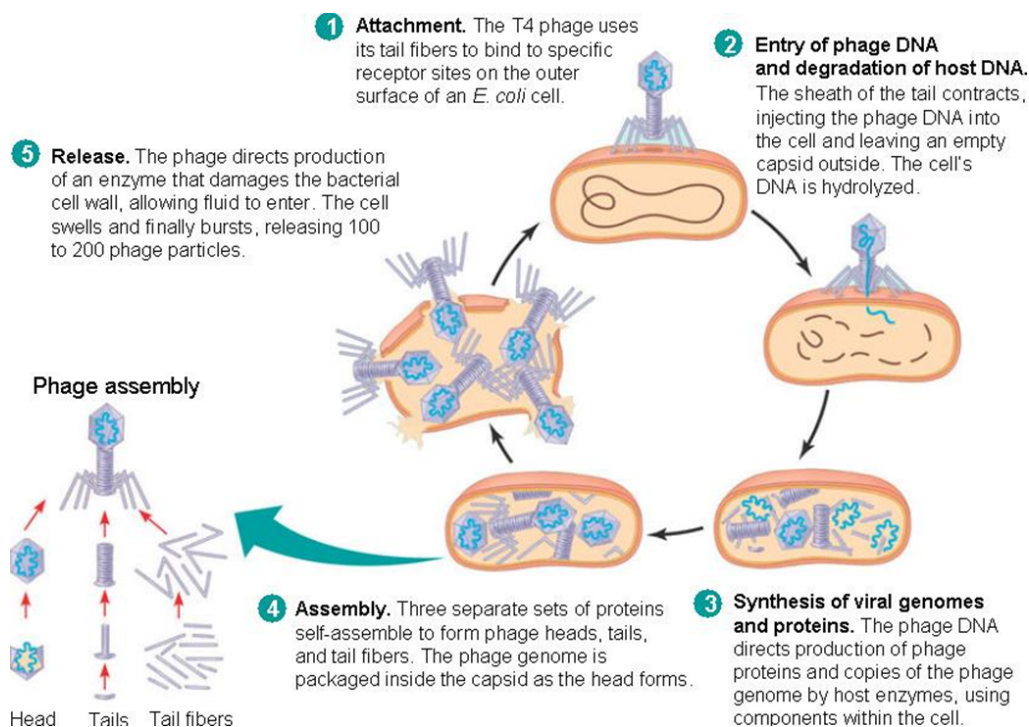
Viruses are unable to multiple or reproduce on their own. Viruses depend entirely on the metabolism of the eukaryotic or prokaryotic cell they infect for reproduction.

Viruses can reproduce in two different ways:

- 1) Lytic Cycle - Infects and affects the a host cell very quickly.  
Ex. Flu, Cold , Ebola
- 2) Lysogenic Cycle - Infects but does not affect immediately.  
Ex. HIV, Herpes

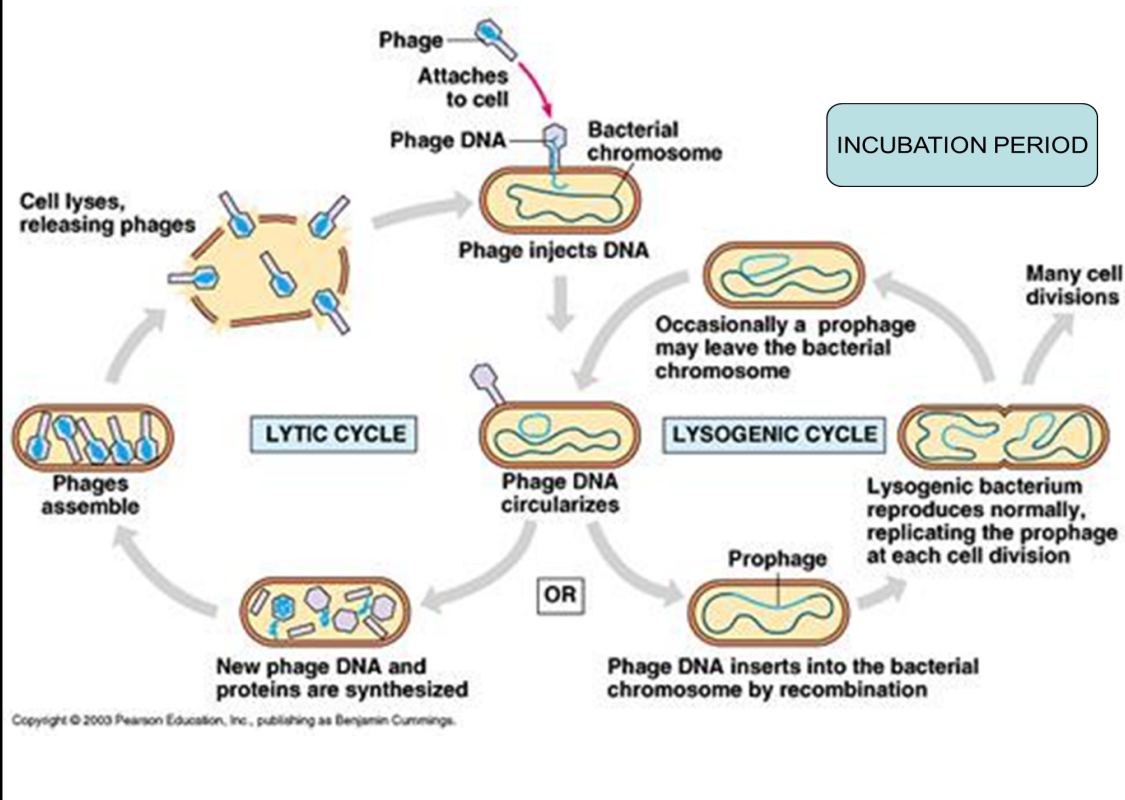
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## Lytic Cycle



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# Lysogenic Cycle



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[Lytic Cycle Video](#)



[Virus Attack Video](#)



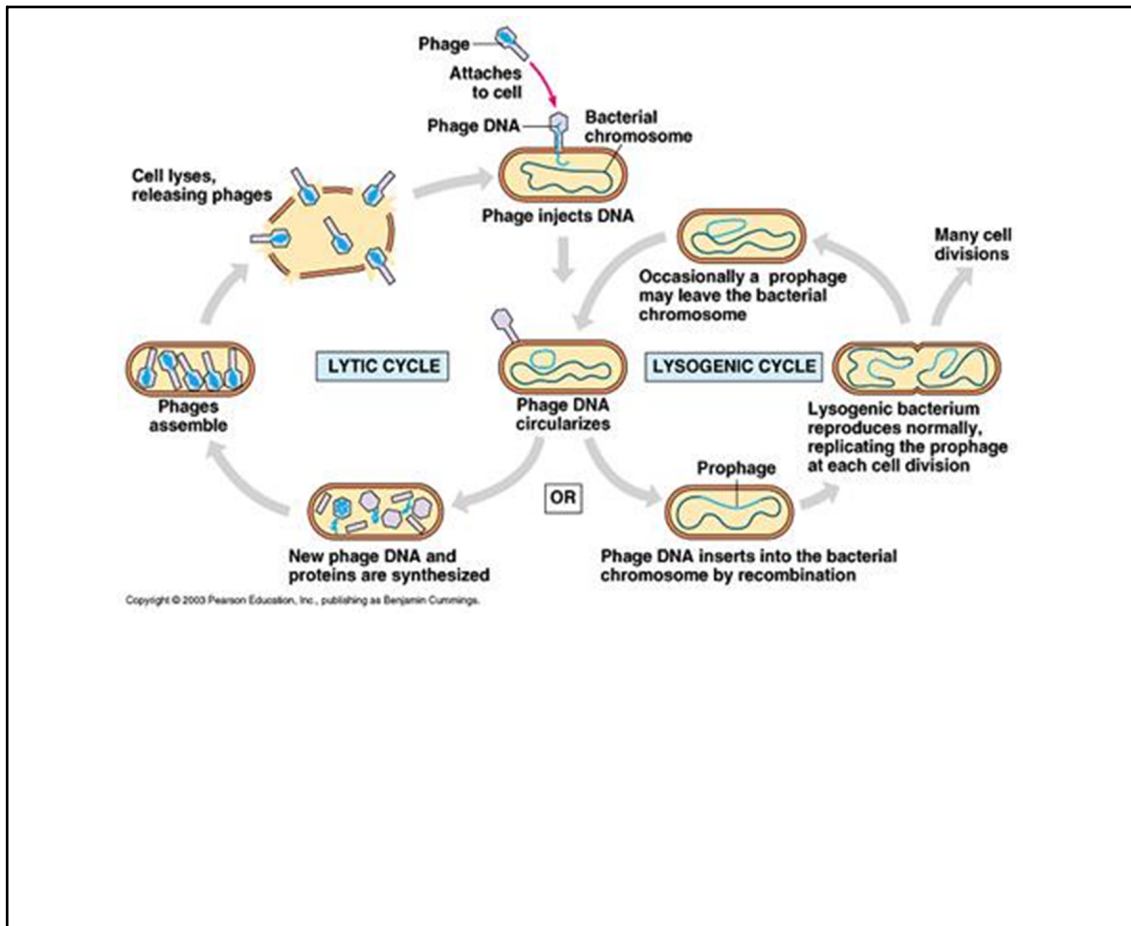
[H1N1 Video](#)



[Lytic Infection Video](#)



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## Vaccines

Vaccines are used to establish immunity.

They can be made of weakened viruses or "dead" viruses.

The body recognizes and destroys the viruses. It will "remember" them so that the next time they are in the body, they will be destroyed.

Ex. The H1N1 Shot



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## Viroids and Prions

### Viroids:

- Infections agents composed of a single circular strand of RNA. They are not protected with a protein coat.
- Viroid RNA does not code for any known protein.
- Mostly affect plants but recently have been found to affect humans.

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### Prions:

- An infectious particle made of protein.
- Affect the brain or neural tissue
- All are untreatable and fatal
- Ex. Mad Cow Disease

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